

AGENDA

Problem Solving:

Developing Disposition, Competence, and Confidence

OVERVIEW

Current state standards call for students to make sense of problems and persevere in solving them. Teachers' instructional practices directly affect students' confidence in their mathematical skills and their willingness to persevere to solve difficult problems.

This full-day course provides teachers with a deeper look at building perseverance in problem solving and applying mathematics to everyday situations. Participants will learn strategies for engaging students in appropriate levels of constructive struggle, thus allowing all students to approach mathematics with confidence and competence. Teachers learn how to maintain the integrity of high-level tasks by structuring lessons to allow students to make connections and develop new mathematical knowledge.

OUTCOMES

- Broaden participants' understanding of how students learn and the features of a classroom environment that promotes confidence and perseverance in students
- Develop a working knowledge of constructive struggle as offering opportunities to involve students in problems that require critical thinking and connections across multiple mathematical concepts, skills, and ideas rather than those that entail superficial application of a rote procedure.
- Examine three core features of the role of the teacher who teaches for understanding
- Consider how two cognitive processes that are key in students' efforts to understand mathematics—reflection and communication—are also tools teachers use to assess student understanding

SUPPORTING CONSTRUCTIVE STRUGGLING

It is important for all students to experience some struggle in order to make sense of mathematics and develop new knowledge. Students will not persevere and be confident in their mathematical skills if we do not provide opportunities to make sense of the math and support them in the process.

Teachers maintain the integrity of high-level tasks by structuring lessons to allow students to make connections and develop new mathematical knowledge.

OPENING—WELCOME, LOGISTICS, AND EXPERIENCES

This introduction includes the course goals, an overview of the practices addressed during the day, and pertinent logistical information.

THE NATURE OF TASKS

The session focuses on grade-level content to highlight the nature of tasks that promote confidence, competence, and perseverance in students. In this session, participants experience firsthand an example of a task that is rigorous yet accessible, at some level, to all students.

PROBLEM SOLVING AND CONSTRUCTIVE STRUGGLE

This session highlights the importance of constructive struggle in a classroom environment that supports students' mathematical practice of making sense of problems and persevering in solving them. Participants solve a problem, communicate orally about their solutions, and record and organize their thinking. In processing this experience, participants discuss important ideas about the role that constructive struggle plays in developing problem-solving skills in students.

HOW LEARNING OCCURS

This session focuses on a view of learning in which people create/construct their own understanding of mathematical concepts/relationships through interactions between their minds & concrete experiences.

LUNCH**HOW LEARNING OCCURS (CONTINUED)****THE PROBLEM-SOLVING LESSON**

The ability to identify and execute the critical phases of a problem-solving lesson, and to ask questions during each phase that compel students to think and reason, is vital to students' learning mathematics with understanding.

REFLECTION AND CLOSING

This session reviews the connections between today's tasks and the processes and students habits of mind, the five pillars for mathematics, and the learning outcomes for the day.

MATH SOLUTIONS GUIDING PRINCIPLES

Drawing upon academic work and our own classroom-grounded research and experience, Math Solutions has identified the following four instructional needs as absolutely essential to improving instruction and student outcomes:

- Robust Content Knowledge
- Understanding of How Students Learn
- Insight into Individual Learners through Formative Assessment
- Effective Instructional Strategies

These four instructional needs drive the design of all Math Solutions courses, consulting and coaching. We consider them our guiding principles and strive to ensure that all educators:

- Know the math they need to teach—know it deeply and flexibly enough to understand various solution paths and students' reasoning.
- Understand the conditions necessary for learning, what they need to provide, and what students must make sense of for themselves.
- Recognize each student's strengths and weaknesses, content knowledge, reasoning strategies, and misconceptions.

- Have the expertise to make math accessible for all students, to ask questions that reveal and build understanding, and help students make sense of and solve problems.